

29 nominal species under one name. However, instead of the one and only *Neoperla spio* (Newman), there is a multitude of segregates. It has been shown before (Zwick, 1972, 1973), that these are not variants, but are specifically distinct. External genitalia, shape of penis and denticulation of the inner membranous sac need to be studied for reliable distinction of ♂♂. Shape and pattern of sternite 8, shape and denticulation of the vagina and receptacular base, and particularly the shape and structures of eggs provide specific characters in ♀♀. As genital characters alone are distinctive, it is easy to sort to species each sex separately, but it is not normally possible to associate sexes. This seriously hampers a revision of the African *Neoperla*.

Several species groups are distinguished, some were discussed in detail. It is as yet uncertain whether all morphological segregates are of specific or intraspecific rank. There are more than 10 species, possibly as many as 25 or even more. Most of them are very widely distributed in Africa.

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MATING BEHAVIOR OF *PARAGNETINA FUMOSA*, *PERLINELLA DRYMO* AND *HYDROPERLA CROSBYI*; WITH SPECIAL EMPHASIS ON EXTERNAL SPERM TRANSFER IN *H. CROSBYI*.

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Virgin adult *Paragnetina fumosa* (Banks), *Perlinella drymo* (Newman) and *Hydroperla crosbyi* (Needham & Claassen) were paired in small plexiglass and glass chambers of various sizes. Super-8 mm cinema photographs and microscopic examination of mating pairs revealed species-specific variations in behavior in all 3 species, and an unreported method of external sperm transfer in *H. crosbyi*. Both males and females of *P. fumosa* and *P. drymo* engaged in drumming prior to mating. Capture involved a mere crawling onto the female by male *P. drymo*, but *P. fumosa* males assumed a distinctive "arched-body" posture during capture and an oblique "head-in-the-air" position during mating. Duration of copulation in both species was ca. 1 hr.

Neither sex of *H. crosbyi* drummed; the male crawled onto the female, assuming a typical superposition, then curved his abdomen around either the left or right side to engage the female subgenital plate with his genital hooks. The subgenital plate was pulled down and action by the accessory external genitalia, primarily the epiproct, resulted in formation of a depression or "sperm pocket" beneath it. Then followed a spontaneous eversion of the membranous male aedeagus, transfer of the sperm mass to the pre-formed "pocket," retraction of the aedeagus, and finally a curious tapping or brushing action by the male cerci on the female cerci. The latter served as a releaser for initiating telescoping contractions of the apical female abdominal segments, resulting in sperm aspiration. Sperm transfer was therefore external, with no copulation. All three species were polygamous.

AN EMERGENCE SEQUENCE OF CHLOROPERLIDAE IN A NORTHEASTERN OHIO STREAM.

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The family Chloroperlidae is well represented in a small isolated stream habitat in northeastern Ohio. This stream flows through a unique, vertical-walled habitat within a dense mixed forest of northern hardwoods and hemlock. The gorge, Stebbins Gulch, has been incised into sandstones and shales to a depth in excess of three hundred feet, creating a relict habitat that is quite different from other stream habitats in northeastern Ohio.

Chloroperlidae present in this stream habitat include three genera and some five species. The species present and emergent periods are: *Alloperla caudata* Frison, May 27–July 29; *A. chloris* Frison, June 18–August 24; *A. imbecilla* (Say), May 20–June 4; *Hastaperla brevis* (Banks), May 20–July 1; and *Sweltsa onkos* (Ricker), May 20–June 18. Thus emergence commences with three species representing all three genera present in the area by May 20 and continues uninterruptedly until as late as August 24, with *Alloperla chloris* terminating the emergence of the family from the stream.

EMERGENCE PATTERNS IN PLECOPTERA.

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Emergence patterns in Plecoptera are discussed on the basis of data collected in 1972–1974 on the L'Achigan River in Quebec. Fifty emergence trap series were analysed from twenty-eight sites on the main-stream and from seventeen sites on six tributary streams.